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- Fig. 10. Dorsal epidermis with stomata of cotyledon;x320.
Fig. 11. Pneumatic tissue of same; x320.
Fig. 12. Dorsal epidermis with stomata of a leaf from a tree;x320.
Fig. 13. Base of a long, unicellular, pointed hair of same;x320.
Fig. 14. Glandular hair of same;x320.
Fig. 15. Cross-section of leaf from a tree, showing a large idioblast in the chlorenchyma; Ep.,* ventral, Ep., dorsal epidermis; x320.
Fig. 16. Cross-section of same leaf, showing a lateral vein with colorless parenchyma, stereome, and parenchyma-sheath, [P. S.); P, palisade tissue; the other letters as above; x320.

Brookland, D. C.

Book Notices.

A NEW HISTORY OF BOTANY

There is not yet extant in the English language any work, or even the beginnings of any work, that is of the nature of a history of botany from the earliest times down to the present. For such history of botany in general as we have we are indebted to the zeal and learning of Frenchmen and Germans of the eighteenth century and the early nineteenth; and these attempts are partly in French, partly in German, and the best of them are in Latin.

There is now in the press in this country, and under the auspices of the Smithsonian Institution at Washington, the first volume of a work in English bearing the title of *Landmarks of Botanical History*; an enterprise undertaken by Doctor Edward L. Greene, an Honorary Associate of the Institution.

The plan of this forthcoming work, as the title implies, is that of a careful study and plain elucidation of principal epochs in the development of the science from the earliest period. Such treatment of a subject as ancient as botany, having a literature so vast, and having undergone so many vicissitudes of advance and retrogression during more than two milleniums, can not by any possibility be reduced to the limits of a single volume, but must fill two or three at the least; and that which it is promised we soon shall see is but a first instalment, and not a very large one, of the *Landmarks*; but as replete with a great number, and much diversity of facts never before presented in any history of botany, that it fills

not much more than 300 pages will not, after due consideration, be thought a small instalment.

The more strictly historical chapters, of which there are eight or nine, are preceded by some 40 pages of an Introductory entitled *Philosophy of Botanical History*; a dissertation on how a history of botany ought to be written; enquiry as to several different lines along which progress ought to take place and should be recorded. Here the somewhat too restricted views of certain earlier historians are adverted to; restrictions due to less comprehensive notions as to what botany really is. Also in this Introductory it is shown that botany, even scientific botany, is so very ancient that its earliest beginnings are traceable to no book, but antedate all writing; that no plant name in any language is the name of an individual plant; that every such name unmistakably implies botanical classification; that these common terms in the speech of every people, plant names, are every one either generic, specific or varietal, not excluding family names, which also occur in the oldest known books that deal with plants. Thus, it is shown, is systematic botany of some kind among the very essentials of human speech and writing, whensoever plants are to be considered. This, apparently the true philosophy of the origin of the science, and of its history, seems to be Doctor Greene's own.

Directly following a short chapter on earliest traces of philosophic botany in very ancient Greek writing, there is a long one on Theophrastus of Eresus, whom the most competent botanical scholars, up to less than a hundred years ago agreed in styling the Father of Botany as a science; whom also our later generations have known nothing of. To the readers of Doctor Greene's *Landmarks* it will appear as if the fundamentals of even modern botany had been settled, set forth in public lectures at ancient Athens, and written into a book by this philosopher two and twenty centuries ago.

The chapter on Theophrastus occupies 90 pages, and is the largest one in the volume. The leading paragraphs of the chapter are in the following succession, and the eye is guided to each by special type: *Life, Method* (in general), *Vegetative Organography, Anthology, Fruit and Seed, Anatomy, Phytography, Taxonomy, Nomenclature, Ecology, Dendrology, Transmutation* (of species, and even genera).

As a contribution to the written history of our science all this matter is new, and will be apt to prove instructive reading to most

of us; for we have been taught, often enough by definite precept, and always and everywhere by implication, that scientific botany had no being until 150, or at farthest 200 years ago.

After the time of Theophrastus the most notable epoch in the advance of botany was that inaugurated in the first half of the sixteenth century; a movement in which certain German professors and physicians had a conspicuous part. These are Brunfels, who lived between 1464 and 1534, Fuchs, 1501-1566, Tragus, 1498-1554, and Valerius Cordus 1515-1544. The German historians of botany, three or four of them, have designated this quartette of celebrities the German Fathers of Botany. This title is conceded them, though with some reluctance by the author of the new *Landmarks*; or, if not exactly with reluctance, at least with some discernment; for the four celebrities, by the careful analysis of the work of each, are seen to fall into two rather distinct categories, so that to Brunfels and Fuchs there is accorded the title of German Fathers of plant Iconography only, while Tragus and Cordus only are accredited as German Fathers of Botany. It is a piece of discrimination that is new; and it amounts to a judgment of the comparative merits of the four which is quite opposite of that to which German historians themselves had arrived; for these almost with one accord make of Brunfels and Fuchs the greatest promoters of botany, holding Tragus and Cordus in less esteem. But in truth, Brunfels and Fuchs did little more than employ excellent artists to draw and picture plants, then proceeded to edit the engravings, accompanied by rather imperfect descriptions borrowed from the ancient Greeks and Romans. But by virtue of the engravings representing some hundreds of plants with a faithfulness to nature which was a new thing in the world, the two folios, that of Brunfels in 1532 and Fuchs in 1542, were immediately successful, immensely fostering a new interest in plants, and this not so much, it may be, among the learned, as among the common people and the illiterate; for not even the rudiments of an education are requisite for the identification of an herb or tree if comparison can be made with a good figure, and there is no need of becoming able to read and understand the description. The two were great popularizers of plant knowledge, at the time; their folios were financially successful; matters which, after all, do not necessarily make very much for the advancement of botany as a science.

Quite the opposite of this were the minds and the works of

Tragus and Valerius Cordus, it would seem; for these are said to have pursued the gathering and studying of plants for the love of plants; and that when each began to think of writing a book, the purpose in either case was, not to employ draftsmen and engravers, but so carefully and faithfully to describe each plant from nature that, to all who could read, the species might be identified by description alone. The folio of Tragus was published first in German, and made so strong an impression by virtue of the life-like picturing of plants by words, as well as by a vast amount of new information conveyed, that the learned botanical world seemed to demand all this in Latin, then still the language of the educated everywhere; and such an edition was given, and even illustrated by many wood cuts, largely copied in smaller size from Fuchs. Valerius Cordus was the last of the four German Fathers, and is usually treated by even German historians as the least among them. Sachs even passes him by with a remark that he was of no importance. Nevertheless, in the judgment of the author of the *Landmarks*, he was by far the ablest and most accomplished of them all, as well as the one who most advanced philosophic and real botany. His description of plants,—both ancient and classic plants, as well as new German species by the score or hundred—are now everywhere seen to far surpass those of any and all of his predecessors. The author of this volume of history reports that Cordus was the first of botanical investigators to note the mode of the enfoldment of any leaves in the bud, and of petals in flower buds; the first to distinguish anther-dust and call it pollen; first to affirm that ferns propagate by the dust on the back of leaves, and to state that this generative dust is not of the same structure as seed. All this, too, long before the invention of the microscope, hand lens, or spectacles. He is accredited as the actual first discover of such familiar types as *Caltha palustris* and *Parnassia palustris* and the cranberry vine, to which also he gave the generic name *Oxycoccus*, which it still is known by. Even the snowball bush, *Viburnum Opulus* variety, which was first seen by Cordus in a German mountain wilderness, and was named by him as a mere variety of the bush called upland cranberry. He was first to describe the sundew, and to publish a report on the nature of the so-called dew on its leaves. The term papilionaceous we appear to owe to Cordus, who is shown to have invented it—to have used it often, and even to have determined as true leguminous plants, certain

small flowered ones whose fruits were not legumes strictly speaking. Being geologist and mineralogist, he is first among botanists to mention, in his ecologies of certain plants, the geologic formation, or at least the probable constituents of the soil in which they grow.

Throughout the volume, the work of each maker of a botanical landmark is analyzed, and the particular lines along which each wrought most are, as we have indicated above, made subjects of special paragraphs, each paragraph showing its caption in prominent type. The first of these paragraphs is always that of the Life of the botanist. These biographic sketches are more full by far than is usual in such history, and will doubtless be read with interest by all botanists, if not even by the unbotanical.

The work will shortly appear, and will form a part of Volume 54 of the Smithsonian Miscellaneous Collections

Editorial Notes.

CHANGES IN PLANT NAMES.

It may be seriously questioned whether in ruling that plant names must begin with the date of Linnaeus' Species Plantarum of 1753, more confusion has resulted than had ever been anticipated. More changes in nomenclature have been made since botanical congresses have convened than before it was deemed necessary to legislate in this matter. Every time a congress meets we are sure that as the result of its artificial decisions a number of well established names will go. The Vienna Congress decided that "nomenclature should not be arbitrary nor imposed by authority" (Art. 3) but based on priority. (Sect. 1, Art. 15) Apart from the fact that one of the first rules (Art. 19) absolutely precludes the idea of priority there can be no more arbitrary decision possible than the statement of Article 20.

"However, to avoid disadvantageous changes in the nomenclature of genera by the strict application of the rules of Nomenclature and especially of the principle of priority in starting from 1753 the rules provide a list of names which must be retained in all cases. These names are by preference those which have come into general use in the fifty years following their publication, or which have been